

Why the Department of Energy Cannot Accept Spent Nuclear Fuel

*William C. Sailor**
Los Alamos National Laboratory
Los Alamos, NM 87545

The deadline for acceptance of spent commercial nuclear fuel by the DOE of January 31, 1998, as specified in the Nuclear Waste Policy Act of 1982, is rapidly approaching and the Department has issued a statement that it cannot meet the deadline. It claims that it has experienced an “unavoidable” delay in its ability to accept or transport spent fuel or in accordance with the applicable schedule. According to a group of contract holders, this appears to be a violation of the Standard Contract that the Department has signed with the majority of nuclear utilities in the United States. On the other hand, the Department has explained in a recent letter to the contract holders that the deadline only applies if a national repository is licensed and ready to accept the spent fuel. Because there is no repository ready the delay is deemed unavoidable. In this paper the events leading up to the dilemma are investigated. It is seen that the delay has indeed been due to circumstances beyond the control of the DOE.

Introduction

President Carter in April 1977 issued a statement on nuclear policy that began with a commitment to defer indefinitely the commercial reprocessing of spent nuclear fuel. A period of national deliberation followed during which the nuclear industry eventually terminated its commercial spent fuel reprocessing activity. The period of deliberation ended with the passage of the Nuclear Waste Policy Act (NWPA) of 1982, where direct disposal of spent fuel in a national geological repository became the baseline US strategy.¹ The 1982 act has been amended several times to accommodate the changing political and technical climate. The original deadline for acceptance of spent fuel by the Department of Energy (DOE) of January 31, 1998 has never been changed.

On December 17, 1996, the DOE sent a letter to its contract holders indicating that it will not be able to accept the spent nuclear fuel according to the published schedule. It is also unclear that the DOE will be ready to accept spent fuel for disposal or for storage at any time in the near future. It is not out of the question that one or more nuclear plants will be shut down because of lack of spent fuel capacity on site.² As a result, a consortium of utilities and state governments sued the US Department of Energy, claiming that the DOE is obligated to accept spent fuel beginning in 1998.³ The DOE has argued that it was not obligated to do so until there was a facility ready to accept the waste for permanent disposal. In a ruling in early 1997, a US district court sided against the DOE, finding that the law requires the Department to accept spent fuel under the law in 1998.

Congress and the DOE have been looking for answers to this dilemma in the form of an

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interim storage facility and several pieces of legislation have been proposed to create such a facility. Most recently, the storage facility would be located at US DOE's Nevada Test Site. This issue has not been resolved in Congress and the legislation is opposed by the representatives from Nevada and by the President. The issue of exactly what to do with spent fuel in this country between now and when the national repository is opened is an issue that may hinge on court decisions.

The Department's position is that the delay has been because of circumstances beyond its control, and indeed the record provided by the DOE Office of Procurement shows that the delay is in fact due to circumstances beyond the reasonable control of DOE.⁴ The anticipated delay may be deemed by the courts "unavoidable" within the meaning of Article IX of the Standard Contract.

The reasons for the delay are outlined in this paper.⁵ While I believe that the delay at issue was unavoidable by the DOE, it is more likely the fault of the US Government as a whole. Therefore, congress should enact legislation to mitigate the consequences of the delay and authorize expenditures specifically to ameliorate utility hardship.

What the Contract Says

In its claims that the delay is unavoidable, the DOE refers to Article IX of the standard contract⁶ which is shown here. In this document SNF refers to Spent Nuclear Fuel and HLW refers to High Level nuclear Waste. In the second sentence of part A, the acts of Government are listed as a possible event "beyond the control of . . . DOE".

Article IX, Part A. Unavoidable Delays by Purchaser or DOE

Neither the Government nor the Purchaser shall be liable under this contract for damages caused by failure to perform its obligations hereunder, if such failure arises out of causes beyond the control and without the fault or negligence of the party failing to perform. In the event circumstances beyond the reasonable control of the Purchaser or DOE--such as acts of God, or of the public enemy, acts of Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather--cause delay in scheduled delivery, acceptance or transport of SNF and/or HLW, the party experiencing the delay will notify the other party as soon as possible after such delay is ascertained and the parties will readjust their schedules, as appropriate, to accommodate such delay.

Article IX, Part B. Avoidable Delays by Purchaser or DOE

In the event of any delay in the delivery, acceptance or transport of SNF and/or HLW to or by DOE caused by circumstances within the reasonable control of either the Purchaser or DOE or their respective contractors or suppliers, the charges and schedules specified by this contract will be equitably adjusted to reflect any estimated additional costs incurred by the party not responsible for or contributing to the delay.

THE LATE 1996 COURT RULING

In Indiana in late 1996, the US Court held that section 302(a)(5)(B) of the Nuclear Waste Policy Act of 1982, as amended (Amended NWPA), creates an obligation in return for payment of fees by utilities that contracted with DOE for disposal services to start disposing of spent nuclear fuel no later than January 31, 1998. The Court remanded the matter to

DOE for further proceedings consistent with the court's opinion. DOE advised contract holders that it anticipated that it will be unable to begin acceptance of spent nuclear fuel for disposal by January 31, 1998. The Office of Civilian Radioactive Waste Management (OCRWM) contends that the delay in disposing of the contract holders' spent fuel is an "unavoidable delay" as defined in Article IX of the Contract, and, accordingly, DOE is not liable for damages caused by failure to perform under the terms of the Contract. In keeping with the mandate of the Court, DOE Office of Procurement reviewed the relevant provisions in the Contract and preliminarily determined whether or not the delay in beginning disposal of spent fuel is unavoidable within the meaning of contract.

BACKGROUND OF CIVILIAN WASTE MANAGEMENT PROGRAM

In order to understand the context within which the delays have occurred and the basis for this determination, it is helpful to review the history of the program and how DOE statutory authority for the implementation of its disposal obligation has evolved over time.

While spent fuel discharge from nuclear power reactors has been safely stored for decades with no discernible adverse effects on the health and safety of the public, spent fuel will remain radioactive, and thus must be isolated, for thousands of years. Consistent with the views of other nations, United States policy has been that our responsibilities to future generations are better discharged by a strategy of final disposal than by reliance on storage. Deep geologic disposal is internationally⁷ recognized as a safe and viable means of disposing of spent nuclear fuel.⁸ However, there is not yet any permanent disposal facility for spent fuel anywhere in the world.

The Nuclear Waste Policy Act of 1982 was enacted (NWPAA) against this background and consistent with federal policy to utilize deep geologic disposal as a permanent solution to spent fuel. The NWPAA established the Office of Civilian Radioactive Waste Management (OCRWM) within the Department of Energy (DOE) to develop and implement a spent fuel management and disposal system for the nation.

DOE recognized in its 1985 Mission Plan the difficult technical and institutional challenges that must be overcome during the course of this program. The technical challenges are great because the isolation of spent fuel involves long time periods not often considered in other human endeavors. The institutional challenges are complex because a few states, and possibly Indian Tribes, have been and will be, asked to host, for the good of the nation, spent fuel disposal or storage facilities. Many states will be traversed by shipments of spent fuel to one or more centralized facilities. The NWPAA not only requires extensive consultation and cooperation with potential host jurisdictions, but also requires grants to be made to such jurisdictions for the purpose of conducting scientific oversight and public information activities. One of the findings of the NWPAA is that "State and public participation in the planning and development of repositories is essential in order to promote public confidence in the safety of disposal."⁹

The original NWPAA required DOE to site, obtain a license, construct, and operate two geologic repositories. The NWPAA gave DOE 180 days to issue general guidelines for the recommendation of area, which were published in final in November 1984 after extensive public review and concurrence by the Nuclear Regulatory Commission (NRC). Draft environmental statements (EA) for nine potential sites were issued in December 1984. More than 20,000 comments were received. As required by the NWPAA, after public briefings and hearings on the EA's, in 1986, DOE issued five final EA's and selected five potentially acceptable sites for the first repository in Mississippi, Nevada, Texas, Utah, and Washington. DOE then recommended to the President, as required by the NWPAA, that

three sites (Yucca Mountain, Nevada, Hanford, Washington; and Deaf Smith County, Texas) be characterized to determine their suitability as repositories. The NWPA also required that DOE select potential sites for the second repository. In 1986, DOE issued a draft area recommendation report that identified potentially acceptable sites for the second repository in 12 areas of seven states and an additional eight backup candidate areas in the same seven states. That report was not finalized because DOE suspended work on the second repository so that information gained in the first repository program could be applied to the second repository¹⁰

In compliance with section 141 of the NWPA, DOE completed a study on the need for a Monitored Retrievable Storage facility and submitted a timely proposal to congress in 1987 for authorization to construct and operate a licensed temporary storage facility in Oak Ridge, Tennessee. DOE stated in 1987 that its plan to start storage operations in 1998 would allow the system to receive spent fuel a full five years sooner than without the storage facility under then-current schedules.¹¹

The Nuclear Waste Policy Amendments Act of 1987 made significant changes to the program. The amendments directed DOE to characterize only the Yucca Mountain site for its suitability as a repository site and prohibited site-specific activities for a second repository. With regard to temporary storage for the spent fuel, the amendments 1) established an independent Monitored Retrievable Storage (MRS) Review commission to report to Congress in 1989 on the need for an MRS facility; 2) prohibited MRS construction until the issuance of an NRC construction authorization for the repository; 3) limited the capacity of the MRS facility to no more than 10,000 metric tons of heavy metal; 4) nullified the DOE recommendation to site an MRS facility in Tennessee, 5) prohibited siting an MRS facility in Nevada, and 6) established the Office of Nuclear Waste Negotiator for the purpose of finding a volunteer site for an MRS facility. Furthermore, the amendments established an eleven-member Nuclear Waste Technical Review Board to be appointed by the President to evaluate the technical and scientific validity of the program activities.

Although the amendments were intended to ease the task of the geological repository program by limiting site characterization activities to one site, the singling out of Nevada as the only potential site caused the State, which strongly opposed that decision, to greatly increase its effort to halt the program. The State of Nevada has had some success at this effort.

The Nuclear Waste Technical Review board, in one of its early actions, recommended that the major component of the site characterization program at Yucca Mountain be reevaluated. This action, combined with the statutory prohibition on siting a temporary storage facility before a site for a repository has been recommended to the President, made it virtually impossible for DOE to begin spent fuel acceptance by 1998.

Why the Delays?

When Congress passed the Nuclear Waste Policy Act in 1982 (NWPA), it prescribed a complex and cumbersome process for the construction and operation of a first-time, state-of-the-art, deep geologic facility for the permanent disposal of the Nation's spent nuclear fuel and high-level waste. Because such a facility had never been constructed before, either in this country or elsewhere in the world, there was no established blueprint for achieving this goal. Congress, nevertheless, established the expectation that a repository could be sited, licensed, constructed and operating by January 31, 1998. Experience has shown that the schedule established by the NWPA for an operational geologic repository was overly optimistic and underestimated the technical, regulatory and institutional challenges that

would confront such effort.

The Department's inability to meet the date established by congress was the result of unavoidable delay and that the causes for that unavoidable delay fall into six broad and overlapping categories: (1) Technical problems (2) Regulatory delays (3) Roadblocks to implementation of interim or monitored retrievable storage (4) Funding restrictions (5) Litigation delays. The discussion that follows demonstrates how each of these causes contributed to the delay.

1. TECHNICAL PROBLEMS

As a state-of-the-art scientific and engineering project grounded in geoscience, hydrology and other scientific endeavors, and one that must project through mathematical modeling of facility performance of a natural and engineered system for at least 10,000 years, the site characterization program ran into many technical difficulties that led to unavoidable delay in commencement of repository operations. Examples of these technical problems include:

Delay in development of prototype dry drilling equipment. Characterization of the unsaturated rocks at Yucca Mountain required the collection of undistributed samples from boreholes up to 2,500 feet deep. Then-current drilling technology methods used for environmental, water well, or oil field drilling could not be utilized to obtain the required undisturbed samples. Thus, special, first-of-a-kind drilling systems had to be designed, procured and tested by DOE before drilling could proceed.

Moreover, air had to be used as the circulating medium, rather than mud, to assure that samples were representative of the in situ rock. Air is not a particularly efficient circulation medium for removing cuttings from the bottom of a hole, and a special reverse/vacuum assist system had to be developed. Penetration rates were lower than expected; equipment development time was longer than anticipated; and the cost of borehole drilling and sampling was greater than expected. As a result, the sampling and analysis of the rock at Yucca Mountain was delayed.

Available methods to address volcanism and faulting were inadequate. Defining the potential hazards posed by volcanoes and earthquakes requires age-dating of soil and rock deposits. Available methods proved to be inadequate to characterize the age either of the Lathrop Wells cinder cone, a volcanic upwelling near Yucca Mountain, or the earthquake faulting at Yucca Mountain. This led to unprecedented scientific debate over the age and origin of the deposits in and around the Yucca Mountain area. As a result, new age-dating techniques had to be pioneered for use in the Yucca Mountain area. Several age dating techniques were developed, used and then revised based on the scientific debate. We expect to reach closure with Nuclear Regulatory Commission staff on this issue this year.¹²

Groundwater Debate - The Szymanski Reports. The vein-like deposits of calcite and silica exposed in the walls of Trench 14 at the Bow Ridge Fault at Yucca Mountain and extending to the floor of the trench have been the subject of extensive scientific debate. The debate concerns the origin of the water responsible for depositing the minerals in the veins. Most scientists believe the deposits were formed by downward percolating rainwater that dissolved carbonate minerals and silica as it moved through the soils and re-deposited them when the waters evaporated at lower levels. However, some scientists, including Jerry S. Szymanski, a scientists employed by DOE at Yucca Mountain, believed that these deposits could have been placed by an upward movement of the groundwater aquifer caused by seismic activity.¹³

Mr. Szymanski published two reports on this problem, in 1989 and in 1992. Because of the potentially serious impact of the concerns raised on the suitability of Yucca Mountain as a geological repository for spent fuel, DOE concluded that it was necessary to accept Mr. Szymanski's recommendation for "an external and independent peer review" of his 1989 report. In January 1990, a five-member panel was selected. The reports resulting from the peer review were completed in 1991. Those reports prompted still further debate, and additional reviews were performed, one by a panel of 17 scientists at the National Academy of Sciences, and one, at the request of the NRC, by the Center of Nuclear Waste Regulatory Analysis. The second report was reviewed by the United States Geological Survey and the Los Alamos National Laboratory. These reviews, which were submitted to the Yucca Mountain office of OCRWM in 1992, indicated the scenarios for such an occurrence were not plausible.

Delay in hydrologic testing at Hanford. While DOE was still required by NWPA to characterize multiple sites for a possible repository, in order to preserve data pertaining to the local groundwater flow system after shaft construction at Hanford, changes had to be made in the hydrologic testing program. This resulted in a delay of about a year in the exploratory shaft schedule for that site. Furthermore, in consultation with the NRC, DOE decided that the hydrologic tests to be conducted before the start of exploratory shaft construction should be far more comprehensive than originally planned. This delayed shaft construction for approximately two years.

2. REGULATORY DELAYS

Because of the nature and potential severity of the risks associated with radioactive waste disposal, the difficulty of the technical challenges posed by a program designed in to safely isolate material for 10,000 years, and the resulting public concerns, the spent fuel disposal program is subject to regulation or oversight by a large, perhaps unprecedented number of agencies and organizations. Each brings its own perspectives and expertise to the task. The challenges of meeting all of the applicable regulatory requirements and expectations and of attempting to build consensus where different regulators have had different approaches to the same or related problems have led to significant and unavoidable delays in the Department's ability to begin to accept spent fuel for disposal.

The following is a description of some of the regulatory, oversight and advisory bodies with whom DOE must work to reach a consensus on the safety and environmental soundness of siting and constructing a repository, and some examples of regulatory issues that have delayed development of a geologic repository.

Nuclear Regulatory Commission. The NRC is responsible for approving any OCRWM storage or disposal facility site and its design. It must license the facility and inspect it during construction and operation. The development of criteria for a deep geologic disposal facility has required the NRC to move well beyond its normal scope of activities, which focus primarily on engineered, not natural, systems. The Commission is also responsible for setting packaging standards and regulates the shipment and containment security of spent nuclear fuel shipments to and from commercial nuclear power plants. Examples of issues raised by the NRC that have unavoidably delayed site characterization for the geologic repository include:

* The NRC expressed concern regarding an inferred fault (one that appears to exist but cannot be definitively determined) in the vicinity of the proposed location of the exploratory shafts at Yucca Mountain. In response, DOE had to undertake a technical assessment review in order to further study the possible fracturing of rocks when sinking shafts.

* NRC regulations require DOE to implement a quality assurance (QA) program for repository site characterization that is based upon the criteria in 10 CFR Part 50, Appendix B, which was promulgated for use in nuclear power reactor license applications. NRC defines quality assurance as all of those planned and systematic actions necessary to provide adequate confidence that the geologic repository and its subsystems will perform satisfactorily in service.¹⁴ Applying the NRC's quality assurance approach for reactors to both the engineered features and the scientific investigation of natural features in a geoscience program at the cutting edge of technology is unprecedented and has proved to be very difficult. The quality assurance concerns of the NRC were not completely resolved until 1991.¹⁵

* The NWPA requires DOE to issue a general plan for its site characterization activities. In 1988, DOE issued a Consultation Draft Site Characterization Plan (SCP) and submitted it to NRC for review. NRC indicated 5 areas of potential objections. DOE and NRC worked to resolve these issues and the SCP was issued in 1988. In July 1989, NRC issued objections to the design control portions of the SCP that resulted in an on-going series of interactions with the NRC. In March 1993, NRC lifted the design control objections, allowing DOE to proceed with the Exploratory Studies Facility design and construction. The three and one-half year period of delay in the start of construction following issuance of the SCP overlapped the development of the QA plan and was primarily driven by the inability to bring about resolution on the QA requirements for Exploratory Studies Facility co-located with a repository.

US Environmental Protection Agency. The Environmental Protection Agency (EPA) is responsible for regulating offsite releases of radioactive material repositories. EPA promulgated such standards in 1986¹⁶ but they were held invalid and remanded to EPA for reconsideration.¹⁷ The Energy Policy Act of 1992 required EPA to develop separate site-specific radiation standards for a repository at Yucca Mountain. EPA has not yet proposed new radiation protection standards. Once EPA promulgates them, the NRC must incorporate the new EPA standards in its repository licensing regulations. The lack of clearly-defined standards has complicated the Department's ability to focus its site investigation activities on clearly-defined regulatory requirements.

Nuclear Waste Technical Review Board. In the late 1980's, the Board recommended that DOE review alternatives to DOE's then-current plan to construct two exploratory shafts and a small underground facility for site characterization. The Board also recommended that DOE conduct more extensive underground investigations than previously planned and maximize the use of the most modern mechanical excavation techniques and tunnel construction methods. DOE reviewed 34 options for the configuration and construction of the Exploratory Studies Facility and concluded that it should use ramps instead of shafts for the Studies Facility. DOE also initiated procurement of state-of-the-art tunnel-boring equipment. The Facility was not completed until April 1997. The significant increase in the extent of underground investigations undertaken since the development of the Mission Plan in 1985 has resulted in a seven-year delay from the schedule originally set in the 1985 Mission Plan.¹⁸

Department of Interior. The Bureau of Land Management (BLM) is responsible for approval of plans to site waste management facilities on Federal lands over which it has jurisdiction. BLM has provided DOE access to Yucca Mountain for site investigation. As discussed below, BLM's grant of a right-of-way has been challenged at the Interior Board of Land Appeals and in court. The Fish and Wildlife Service, which is responsible for implementation of the Endangered Species Act, announced its emergency listing of the desert tortoise, which inhabits areas of Yucca Mountain, as an endangered species. As a result of the listing, DOE had to restrict the access to the Yucca Mountain site, and prepare

a biological assessment to evaluate the Project's potential effects on the tortoise and alternatives for avoiding or minimizing impacts.¹⁹

Nevada Division of Environmental Protection and Nevada State Engineer.

The Yucca Mountain project, like other federal actions, is subject to extensive state environmental regulation. Because Nevada is an unwilling host for this project, the need to obtain state environmental permits has caused considerable delay. In 1988 and 1989, DOE submitted applications to Nevada for air, underground water withdrawal, and underground injection permits in order to begin site characterization at Yucca Mountain. The State failed to act on those applications. Instead, the State returned the permit applications to DOE on the grounds that: (1) Nevada law made it illegal to store high-level radioactive waste in Nevada, and (2) recent State legislative resolutions opposed the siting of a radioactive waste repository anywhere in the State and prohibited a repository at Yucca Mountain.

A location was originally selected in Area 25 of the Nevada Test Site to conduct prototype drilling in order to develop a drilling system for Yucca Mountain site characterization. Test drilling at Yucca Mountain was delayed because Nevada refused to issue an operating permit required by Nevada air-quality regulations. In order to proceed, DOE moved the test drilling to a site in Utah to test the prototype dry drilling equipment.

In 1990 DOE, through the Department of Justice, brought suit to force the State to act on the permit applications and to prohibit Nevada from unlawfully interfering with its site characterization activities. The State's interference with site characterization continued until May of 1991 when the court ordered Nevada to process the air and underground injection permits. In July 1991, after issuance of the two permits, DOE began the first surface disturbing work at Yucca Mountain since 1986. In March 1992, following a lengthy hearing, the State issued a water permit to DOE to withdraw water at the Yucca Mountain site.²⁰

3. ROADBLOCKS TO IMPLEMENTATION OF AN MRS

The Department recognized early in the life of the program that it would be extremely difficult to have an operating geologic repository ready to accept spent nuclear fuel by January 31, 1998, and it made two different efforts to provide for temporary storage by that date. The first effort was rebuffed by the utilities, the second effort was blocked by Congress. In fiscal year 1994, DOE was barred from providing funding assistance to facilitate the separate efforts of the Nuclear Waste Negotiator.

A. Federal Interim Storage. Beginning in January 1984, DOE offered to provide a Federal Interim Storage (FIS) Program to utilities as authorized by Subtitle B of the NWSA²¹ The Department considered a number of alternative storage methods, potential sites, and transportation arrangements; it analyzed the need for FIS, and it developed a plan for deployment of FIS, including estimated costs and schedules.²² No utility elected to participate in this program. Thus, the program terminated in accordance with the NWSA on January 1, 1990.

B. Monitored Retrievable Storage. In 1987, DOE recognized that it could not begin to dispose of spent fuel in a repository before 2003. In light of the statutory and contractual provisions calling for spent fuel acceptance to begin in 1998, the Department announced that its preferred strategy was "to meet the terms of the contract ... based on a waste-management system that includes an integral MRS (monitored retrievable storage) facility." However, DOE was prevented from siting, constructing, and operating an MRS facility, first as the result of litigation initiated by the State of Tennessee, which temporarily blocked submission of a proposal to Congress to locate a storage facility in that State, and

subsequently by action by Congress in the 1987 amendments to the NWSA.

Section 141(b) of the NWSA directed DOE to complete a detailed study of the need for and feasibility of an MRS and to submit to Congress on or before June 1, 1985, a proposal for construction and operation of one or more MRS facilities for receiving and storing spent nuclear fuel. Pursuant to this direction, DOE completed a study on the need for an MRS and in a timely manner prepared a proposal to Congress for authorization to construct and operate a licensed MRS at Oak Ridge, Tennessee.²³ The schedule proposed by DOE called for an MRS facility to be licensed, constructed, and operated at the Oak Ridge site by January 31, 1998.

In 1985, Tennessee sued to block the submission of the proposal to Congress. In 1986, the US District Court in Tennessee granted an injunction preventing submission of the MRS proposal to Congress. That decision was subsequently overturned.²⁴ The Supreme Court denied review in 1987. Two years were lost in litigation. Moreover, by that time, Congress stepped in to permanently block use of the Oak Ridge site for an MRS and to impose new restrictions with respect to siting an MRS facility at any other site, thus virtually assuring that DOE would not have an operational MRS facility by January 31, 1998. First, Congress nullified DOE's proposal to site, construct, and operate an MRS at Oak Ridge, Tennessee. Second, Congress linked authority to site, construct and operate an MRS to significant progress on the geologic repository, and provided that no MRS could be constructed in the State of Nevada.²⁵

The 1987 amendments to the NWSA established within the Executive Branch the Office of the Nuclear Waste Negotiator, which was authorized for five years to attempt to locate and recommend for Congressional approval a voluntary candidate site for an MRS. Although the Negotiator's Office was re-authorized for one more year after its original expiration date, it never achieved its purpose of finding a voluntary candidate site. The failure to site an MRS was likely due in part to the provision in DOE's FY 1994 appropriations²⁶ that prohibited DOE from providing grants to States and Tribes for the purpose of studying the feasibility of siting an MRS.

4. FUNDING RESTRICTIONS

OCRWM's waste disposal and storage program activities are funded through fees paid by Standard Contract holders to the Nuclear Waste Fund. The Nuclear Waste Fund was established to ensure that funds would be available as needed to implement commitments in the NWSA. Congressional appropriations are required, however, as a prerequisite for OCRWM expenditure of Nuclear Waste Fund moneys.

Congressional appropriations matched funding requests during the first several years of the Program. However, deficit control legislation enacted in 1985, the Gramm-Rudman-Hollings deficit control legislation, began to constrain funding requests and appropriations, thus resulting in unavoidable delays in the program. The Waste Fund was not exempted from the unified budget of the US Government as a whole. From FY 1986 through FY 1990, DOE requested increased appropriations for site characterization, but appropriations declined from \$499 million to \$295 million.

Passage of the Omnibus Budget Reconciliation Act of 1990 resulted in additional budget pressures on the OCRWM's program. Under this legislation, overall budget constraints on DOE discretionary funds resulted in amounts requested for OCRWM operations at levels well below amounts needed to maintain OCRWM's planned schedules. Further exacerbating the funding problem, Congress appropriated amounts significantly below the requested levels. The total appropriations shortfall from FY 1988 through FY 1994

amounted to about \$850 million.

From time-to-time, Congress has also restricted spending on particular activities. For example, in an attempt to meet the 1998 deadline, DOE had initiated innovative approaches to repository development, such as the integration of the exploratory shafts into the construction of the repository. However, the conference report accompanying the Department's FY 1987 appropriations directed the Department not to spend any FY 1987 funds for drilling exploratory shafts.²⁷ This single action alone added a year to the schedule for sinking shafts.

In 1994, OCRWM reconfigured its program planning under a method designated the Program Approach in order to be more effectively deal with the budget constraints. Congress supported it with an FY 1995 appropriation of \$522 million. (The Administration had requested \$532 million.) For FY 1996, the Administration requested \$630 million for OCRWM to continue the new Program Approach, but Congress appropriated only \$400 million and earmarked \$84 million of that for interim storage. Because there is no statutory authority to site and construct a storage facility, the effective FY 1996 funding level was \$315 million, which represented a forty percent reduction in the level of effort from FY 1995. In response, DOE was required to reduce OCRWM's Yucca Mountain operations by one-third. Work on waste acceptance activities and interim storage facility design efforts were also reduced.

5. LITIGATION DELAYS

The spent fuel and high level radioactive waste management program has been subject to approximately two dozen different lawsuits. Many of those lawsuits were brought by Nevada, reflecting its strong and continuing opposition to the siting of a spent fuel and high level radioactive waste disposal facility within its borders. The lawsuits that involve Nevada have in general been of a nature so as to slow progress of the Yucca Mountain characterization.

6. CONCLUSIONS

The record provided by the Office of Procurement shows that the delay was due to circumstances beyond the reasonable control of DOE and therefore the anticipated delay was "unavoidable" within the meaning of Article IX of the Standard Contract. The delay is more likely the fault of the Congress and is best solved through an act of Congress.

The Department of Energy cannot accept spent fuel for disposal primarily because of the greatly increased requirements for underground testing and characterization at Yucca Mountain that were brought about by the consensus of the Nuclear Waste Technical Review Board. Because there is no reason to believe that the current tests are not required, it must be concluded that the original schedule proposed in the 1982 NWSA was simply not implementable.

Time has also been lost in delays caused by the State of Nevada opposition to the characterization project and its unwillingness to cooperate in permitting procedures. Funding for the nuclear waste program has not been increased to make up for the time lost; rather it has been reduced by Congress while the technical requirements for characterization have increased.

The Department has also been prevented by the 1987 amendments to the NWSA from designing and constructing a Monitored Storage Facility until the site characterization work

is complete. The passage of these amendments by Congress in 1987 is the principle reason (aside from technical issues at Yucca Mountain) why the DOE will not meet its January 31, 1998 deadline.

Carrying out the required consultation with stakeholders and the public (as opposed to litigation) has not been shown to contribute to the unavoidable delays that the program has experienced. However, it should be noted that allocations of funds to the Department for the spent fuel program must always include adequate funding for the needs of the consultation process.

7. ACKNOWLEDGEMENTS

Steven Kraft of the Nuclear Energy Institute provided a fax copy of the letter from the DOE Office of Procurement that is listed as Reference 4. Conversations with Bill Barnard, Executive Director of the Nuclear Waste Technical Review Board, Kevin Crowley of the National Academy of Sciences and Chauncey Starr of the Electric Power Research Institute were useful in preparation of this paper.

¹ The law in its current form is at <http://www.rw.doe.gov/pages/resource/nwpa/nwpa.htm>.

² The Costs of Prolonging the Status Quo, Kris Sanda, Radwaste Magazine, May 1997.

³ Nuclear Waste News, June 26, 1997.

⁴ "Contracting Officer's Preliminary Determination that the Department of Energy's Delay in Beginning Spent Fuel Was Unavoidable," attachment to a letter from DOE headquarters to the nation's nuclear utilities, dated June 3, 1997.

⁵ An excellent overview of the problem is given in "Nuclear Imperatives and Public Trust: Dealing with Radioactive Waste," Luther Carter, Resources for The Future, 1987.

⁶ The standard contract is contained in the Code of Federal Regulations, 10 CFR 961.

⁷ Environmental and Ethical Basis of Geologic Disposal, 8, 13, Nuclear Energy Agency, OBCD, Paris, France

⁸ OCRWM DOE, Mission Plan 3, DOE/ER-0005 (1985).

⁹ Section 111(a)(6) of the NWPA.

¹⁰ OCRWM, DOE Mission Plan Amendment 49-50, DOE/RW-0128 (1987).

¹¹ OCRWM, DOE Monitored Retrievable Storage, Submission to Congress Volume 1, page 3 (March 1987), DOE/RW-0035/1-Rev 1.

¹² OCRWM, DOE, Characterization Progress Report Yucca Mountain, Nevada, Number 15, pages A52-A55, DOE/RW-0498 (April 1997).

¹³ OCRWM, DOE, FY 1992 Annual Report the Congress 20, DOE/RW-0422 (July 1993).

¹⁴ 10 CFR 60.150.

¹⁵ OCRWM, DOE, Annual Report to Congress 29, DOE/RW-0144 (April 1987); OCRWM DOE, FY 1992 Annual Report to Congress 5-6, DOE/RW-0422 (July 1993).

¹⁶ 40 CFR Part 191.

¹⁷ *Natural Resources Defense Council v EPA*, 824 F.2d 1258 (1st Cir. 1987).

¹⁸ First Report to the U.S. Congress and the U.S. Secretary of Energy from the Nuclear Waste Technical Review Board 12,13 (March 1990), Third Report to the U.S. Congress and the U.S. Secretary of Energy from the Nuclear Waste Technical Review Board 9-11,13 (May 1991); Mission Plan 59.

¹⁹ OCRWM, DOE, Progress Report on the Scientific Investigation Program for the Nevada Yucca Mountain Site, Number 2, page 11, DOE/RW-0292P (1990) (Progress Report).

²⁰ Progress Report Number 5, pages 2-3, DOE/RW-0307P-5 (June 1992).

²¹ OCRWM, DOE, Initial Implementation Plan for Deployment of Federal Interim Storage Facilities for Commercial Spent Nuclear Fuel DOE/RW-0003(1984); OCRWM, DOE, Implementation Plan for

Deployment of Federal Interim Storage Facilities for Commercial Spent Nuclear Fuel DOE/RW-0019(1985); Id., DOE/RW-0045(1986); Id. DOE/RW-0120(1986); Id. DOE/RW-0186(1988).

²² Nuclear Waste Policy Act Project Office, DOE, Federal Interim Storage Fee Study for Civilian Spent Nuclear Fuel: A Technical and Economic Analysis, DOE/S-0023(1983).

²³ Congressional Proposal EC-1022, 100th Congress.

²⁴ Tennessee v. Herrington, 806 F.2d 642 (6th Cir. 1986).

²⁵ Sections 142 and 148 of the Amended NWPA.

²⁶ Energy and Water Development Appropriations Act, 1994, Pub. L. No. 103-126, October 28, 1993

²⁷ H.R. Rep. No. 99-1005, 99th Cong., 2d Sess. 651 (1986).